

Lessons Learned from the 1997 Lost Source Exercise
William E. Belanger
EPA Region III

Introduction

During the mid to late 1990s, radiation detection systems have been installed in increasing numbers at waste disposal and processing facilities, as well as scrap metal facilities. During this time the States, the U.S. Nuclear Regulatory Commission and the U.S. Environmental protection Agency have noticed a significant increase in the number radiation alarms reported by these facilities. This increase most likely reflects an increase in the number of radiation detectors present at waste disposal and scrap metal facilities rather than an increase in the amount of uncontrolled radioactive material. Nonetheless, there is a significant potential for radioactive sources to find their way into commerce, which NRC is working to reduce. Examples of these "lost sources" include the following.

In August of 1996, workers removed a radioactive gauge containing americium-241 from an industrial process in Racine, Wisconsin. The Radiation Safety Officer did not discover the unauthorized removal of the gauge until November of that year. The source was never recovered, and the licensee believes it was sent to a landfill.

In September 1997 a radiography camera was reported missing. The camera was located in a pickup truck and the truck was stolen. The incident happened near Tulsa, Oklahoma. The camera was subsequently recovered and was intact, but there had been the potential for it to enter the waste stream or the scrap metal market. Loss of a source of this type is the basis for the data used in the Lost Source Exercise.

In September of 1997, an americium-241 gauge was removed from an assembly line in Allentown, Pennsylvania. In this incident, the gauge found its way to an automotive scrap metal facility. Unlike the 1996 incident, the gauge went through the metal shredder and the container was breached. This resulted in approximately 40 cubic yards of contaminated waste, as well as the ruptured source, which the Department of Energy removed for disposal. This incident was noteworthy because, in responding to the State request for assistance, Federal Agencies followed the procedures described in this exercise.

In all, during 1996 (the latest year available at the time of this writing), NRC's Office for Analysis of Operational Data³ reported 88 incidents where there was a loss of control of NRC licensed material, and 76 similar incidents of agreement-state licensed material. Lubenau and Yusko^{1,2} have also described the occurrence of radioactive materials in recycled metals.

While the regulatory agencies may be able to reduce the number of incidents where there is a loss of control over radioactive materials, there will always be a potential for radioactive materials to enter the waste and scrap metal operations. It is not practical to reduce human error to zero and there are also foreign sources where United States regulatory agencies have no authority.

EPA and NRC and DOE share responsibility for supporting the States in radiological incidents in the public domain and are natural partners in radiological response. The Federal Radiological Emergency Response Plan (FRERP), dated May 8, 1996, designates a Lead Federal Agency (LFA) for radiological responses to emergencies. For example, the EPA is the designated LFA for responses to emergencies in which sources are of unknown, unlicensed, or foreign origin. By contrast, the NRC is the designated LFA for responding to incidents involving materials licensed by the NRC or an Agreement State. The DOE maintains an independent Radiological Assistance Program which may respond to State requests for assistance independently or as part of the FRERP.

The EPA also has the ability to respond pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, of 1980 (CERCLA), as amended, and the National Contingency Plan (NCP) adopted under CERCLA authority. CERCLA and the NCP give EPA broad funding and response authority to protect the health and welfare of the public and the environment. This response may come as a part of the emergency response, or may be delivered in the post-emergency phase, or both, as long as there continues to be a "threat of release."

The Lost Source Exercise, conducted in Coatesville, PA in September and October of 1997, was an opportunity for the EPA and the NRC to coordinate their response efforts with those of DOE and state and local officials to address a public domain incident using FRERP and NCP authorities. This exercise examined the ways that Federal assistance can be provided to state and local officials by the EPA, NRC, DOE pursuant to the FRERP and NCP during a public domain, private sector incident. The exercise scenario involved an unshielded, 100 Curie radiography camera arriving at a municipal waste landfill in a trash truck. This scenario provided ample technical as well as administrative challenges to the participants, who were drawn from all levels of government and from the private sector. The exercise was held in two parts, representing the emergency phase and the post-emergency phase. For the purpose of this paper, we define the emergency phase as the period when there is an imminent threat to public health, and the post-emergency phase as that period when the immediate threat has been controlled, but there may be substantial clean-up remaining. In this exercise, the post-emergency phase began when the trash truck had been (simulated) relocated to a remote area where it posed no immediate threat, but the source had not yet been recovered. The post-emergency exercise consisted of the recovery of a dummy radiography source and camera from a load of simulated municipal waste. The Federal response for both the emergency and post-emergency phases was provided pursuant to the National Contingency Plan.

Discussion

The EPA and the NRC conceived and conducted the Lost Source exercise to demonstrate the capability to mount a regional multi-agency response to a radioactive material release in the public domain, since such releases in the public domain pose a different set of problems than those involving a fixed nuclear facility. In the public domain, there is no advance knowledge of where a release might occur, and the identity of the licensee or responsible party might not be known or the licensee might not have the ability to maintain financial responsibility. By contrast, releases at a fixed facility usually originate from a point somewhere within the facility, and the fixed facility has a known licensee or

responsible party who can be held responsible for cleanup activities. Consequently, for releases in the public domain where the identity of the licensee is unknown or where the material is of foreign origin, the FRERP designates the EPA as the lead Federal agency.

This exercise involved EPA Region III, NRC Region I, the DOE Brookhaven RAP team, Pennsylvania DEP and PEMA (the cognizant State agencies in this case) local officials and solid waste industry representatives. Representatives from FEMA and the DOD Defense Nuclear Weapons School observed the exercise and discussed the capabilities which could be provided by their agencies. The response was conducted at the regional level for two reasons. First, the EPA Region III RERP was unique when the exercise was conducted, because it included radiological incident response under the NCP. Second, the size and nature of the release were chosen to require only a response on the regional level, a situation which is typical of most releases in the public domain. The regional response reflected the provisions of the FRERP, while also examining resources available through the NCP that may be appropriate with the EPA as the designated LFA. Also, the reader should note that, in playing the cognizant state government, Pennsylvania represented the necessary interface between the Federal government and any State involved in a given incident.

Conclusions

In addition to demonstrating multi-agency response capability, the Lost Source Exercise yielded a number of ancillary benefits. For example, this exercise gave participants the opportunity to review current incident response plans, which are geared to the FRERP, and to determine how those plans may need to be better integrated with the NCP. In particular, this exercise examined the process for determining LFA responsibilities and other agency support activities. This is important, since the recent revisions to the FRERP have not otherwise been exercised under conditions involving a spill of radiological material of unknown ownership licensed under the Atomic Energy Act (AEA), with the EPA designated as LFA. In that capacity, the EPA's primary intent is to coordinate Federal response and assistance activities from the scene.

As a result of the lost Source Exercise, the participants learned the following lessons:

- C The EPA Superfund Program encompasses substantial capabilities and authorities, which can be mobilized in the event of a radiation emergency (whether or not the material is licensed under the AEA.)
- C Each responding entity has its own goals and priorities during a response. These goals and priorities are dynamic and may evolve as the situation develops. For example, in this exercise, private industry wanted to minimize the impact on business operations, solid waste agencies wanted to ensure that the continuing stream of municipal waste had a place to go, county officials handled the immediate threat, State officials had the ultimate responsibility to protect public health from the radiation threat, and Federal officials provided technical support and had the capability to mobilize significant resources. While it was not apparent in this exercise, these dynamic priorities might be expected to conflict at times throughout a response.

- C Federal notification procedures are well defined within each federal agency, but an individual agency's internal procedures are not well known among the other agencies. Consequently, the federal community needs to develop a standardized notification scheme that applies to the Federal response as a whole. While the FRERP provides a standardized notification scheme among the agencies, internal procedures are not consistent from agency to agency. This can result in confusion as the federal team is formed.
- C The Unified Incident Command concept was not familiar to all of the participants. This concept needs to be better explained in future exercises and training opportunities. By providing a practical scenario to apply the UIC concept, this exercise gave participants a valuable learning experience. Many participants suggested in their comments that this experience should be shared with others.
- C Notification thresholds need to be better defined for each agency and office. The NCP specifies required notification of the National Response Center of releases of all chemicals (including radioactive materials) exceeding certain reportable quantities specified in the NCP. The agencies responding to radiation incidents are generally unfamiliar with this legal requirement. A courtesy notification at lower levels should also be considered.
- C Federal officials need to recognize that the States differ greatly in their capabilities and their needs. This includes responsibilities associated with Agreement State status, different responding organizations within each State, and the roles of local government in emergency response.
- C Early notification of the appropriate DOE RAP team should be routine. The RAP team needs to know of a developing situation, rather than simply being called in after the fact.
- C Private sector capabilities and constraints are highly variable and will need to be considered on a case-by-case basis. Industry groups should be consulted when government emergency response plans and procedures are formulated.
- C Local government may play a significant role in emergency response and must not be overlooked in either the planning or the response, in both the emergency phase and post-emergency phase.
- C Agency acronyms and jargon should be carefully avoided when multiple agencies are acting in concert. There are many conflicting acronyms between agencies. For example, "NRC" may stand for the U.S. Nuclear Regulatory Commission or the EPA's National Response Center. Such conflicts and unfamiliar jargon restrict effective communication.
- C The DOE and DOD possess a large body of expertise and resources, and the FRERP and NCP provide a means to access those resources. In addition, individual cooperative agreements between the various agencies can be used in addressing incidents. The Unified

Incident Command gives a useful mechanism to employ these cooperative agreements.

- C Many participants also commented that the opportunity to witness recovery of a highly radioactive source very valuable, and that the experience should be provided to others.

Overall, the exercise demonstrated the role of the NCP in the response to a radiological incident. This response need not be confined to the emergency phase. In fact, the resources available through the NCP may be more important in the post-emergency phase, as the cleanup effort becomes the focus of the response. This is especially true when EPA is the LFA under the FRERP, since EPA is designated LFA mainly in circumstances where there is no licensee or otherwise well defined responsible party who can conduct the cleanup.

References

1. Lubenau and Yusko, Radioactive Materials in Recycled Metals - an Update, Health Physics 74:293, March, 1998.
2. Lubenau and Yusko, Radioactive Materials in Recycled Metals, Health Physics 68:440, April 1995.
3. Nuclear Regulatory Commission, Analysis and Evaluation of Operational Data - Annual Report, 1996, NUREG 1272, December, 1997